

Engineering Institute Seminar



Professor Keith Worden
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Compressed Sensing Fundamentals I and II

Thursday, May 10, 2012

1:00 - 2:00 & 2:15 - 3:15 PM

Los Alamos Research Park, TA-03, Bldg. 4200 , Suite 101,
Access Grid Conference Room

Abstract: In many areas of engineering - structural health monitoring being a good example - there is the possibility of acquiring large amounts of data. If resources for storage or transmission are limited, it becomes necessary to compress data in such a way that salient information is preserved. A recent addition to compression technology is the body of work comprising compressive or compressed sensing. The key to the approach is the representation of data with respect to an expansion basis where only a sparse set of expansion coefficients are non-zero. In compressive sensing, the sparse representation is achieved by minimizing the L1 norm of the reconstruction error; this is a marked contrast to approaches based on least squared-error (L2 norm) minimization. This tutorial will provide the background to compressive sensing without resorting to detailed proof of many of the results.

Biography: Keith, based in the Department of Mechanical Engineering at the University of Sheffield, UK, has 25 years of experience of research in structural dynamics with an emphasis on signal processing and interpretation. He has held a UK EPSRC Advanced Fellowship on *A Holistic Approach to Damage Identification*. He is the author or co-author of two books and over 400 journal and conference papers. He is a member of the EPSRC peer review college and sits on the editorial board of three international journals. In the past he has been coordinator of the EU COST F3 action on Structural Dynamics working group WG2 on Structural Health Monitoring (SHM), and was an initiator of the EPSRC network on Structural Integrity and Damage Assessment (SIDANET). Keith was also PI on the recently-completed project *Smart Sensing for Structural Health Monitoring (S3HM)* which was coordinated by the European Research Council and brought together leading European researchers in the field of vibration-based SHM. Professor Worden is a Fellow of the Institute of Physics, the Institute of Mathematics and its Applications, and the Institution of Mechanical Engineers. He was jointly awarded *Person of the Year 2004* by the International Journal of SHM for his work on structural health monitoring.